

Claims

1. Steel for mechanical construction, wherein its composition in percentages by weight is:
  - $0.35\% \leq C \leq 1.2\%$
  - $0.10\% \leq Mn \leq 2.0\%$
  - $0.10\% \leq Si \leq 3.0\%$
  - $traces \leq Cr \leq 4.5\%$
  - $traces \leq Mo \leq 2.0\%$
  - $traces \leq Ni \leq 4.5\%$
  - $traces \leq V \leq 0.5\%$
  - $traces \leq Cu \leq 3.5\%$  with  $Cu \leq Ni\% + 0.6 Si\%$  if  $Cu \geq 0.5\%$
  - $traces \leq P \leq 0.200\%$ ,  $traces \leq Sn \leq 0.150\%$ ,  $traces \leq As \leq 0.100\%$ ,  $traces \leq Sb \leq 0.150\%$ , with  $0.050\% \leq P\% + Bi\% + Sn\% + As\% + Sb\% \leq 0.200\%$ ,
  - $traces \leq Al \leq 0.060\%$
  - $traces \leq Ca \leq 0.050\%$
  - $traces \leq B \leq 0.01\%$
  - $traces \leq S \leq 0.0200\%$
  - $traces \leq Te \leq 0.020\%$
  - $traces \leq Se \leq 0.040\%$
  - $traces \leq Pb \leq 0.070\%$
  - $traces \leq Nb \leq 0.050\%$
  - $traces \leq Ti \leq 0.050\%$the remainder being iron and impurities resulting from the manufacture.
2. Steel as claimed in Claim 1, wherein its Si content is between 0.10% and 1.0%.
3. Steel as claimed in Claim 1, wherein the ratio  $Mn\%/Si\%$  is greater than or equal to
- 0.4.

4. Steel as claimed in Claim 2, wherein the ratio Mn%/Si% is greater than or equal to 0.4.

5. Method of hot-shaping a steel part, wherein:

- a billet of steel is obtained with the following composition in percentages by weight;
  - $0.35\% \leq C \leq 1.2\%$
  - $0.10\% \leq Mn \leq 2.0\%$ , preferably with  $Mn\%/Si\% \geq 0.4$
  - $0.10\% \leq Si \leq 3.0\%$ , preferably  $0.10\% \leq Si \leq 1.0\%$
  - $traces \leq Cr \leq 4.5\%$
  - $traces \leq Mo \leq 2.0\%$
  - $traces \leq Ni \leq 4.5\%$
  - $traces \leq V \leq 0.5\%$
  - $traces \leq Cu \leq 3.5\%$  with  $Cu \leq Ni\% + 0.6 Si\%$  if  $Cu \geq 0.5\%$
  - $traces \leq P \leq 0.200\%$ ,  $traces \leq Sn \leq 0.150\%$ ,  $traces \leq As \leq 0.100\%$ ,  $traces \leq Sb \leq 0.150\%$ , with  $0.050\% \leq P\% + Bi\% + Sn\% + As\% + Sb\% \leq 0.200\%$ ,
  - $traces \leq Al \leq 0.060\%$
  - $traces \leq Ca \leq 0.050\%$
  - $traces \leq B \leq 0.01\%$
  - $traces \leq S \leq 0.0200\%$
  - $traces \leq Te \leq 0.020\%$
  - $traces \leq Se \leq 0.040\%$
  - $traces \leq Pb \leq 0.070\%$
  - $traces \leq Nb \leq 0.050\%$
  - $traces \leq Ti \leq 0.050\%$
- the remainder being iron and impurities resulting from the manufacture.
- a heat treatment is if need be applied to it, which gives it a globular primary structure;
  - it is heated to an intermediate temperature between its solidus temperature and its liquidus temperature under conditions such that the solid fraction has a globular structure;
  - thixoforging of the said billet is carried out so as to obtain the said part;
  - and cooling of the said part is carried out.

6. Method as claimed in Claim 5, wherein the said thixoforging takes place in a zone of temperatures where the liquid material fraction present in the billet is between 10 and 40%.